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SEPTEMBER, 1925

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Industrial Finishing

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With the Editor

AN INDUSTRIAL FINISHING FOREMAN is the title of a snappy bit of copy from a foreman finisher, L. S. Decker, who was prompted to deliver this "punch" after reading an editorial on page 28 of June INDUSTRIAL FINISHING. Mr. Decker writes:

"In reply to the letter in June issue of INDUSTRIAL FINISHING entitled 'Trained Finishers Needed', I should like to say that you have hit the nail squarely on the head. The majority of men today have not the punch needed. Foremen have got to be close to their men and use them just as they like to be used by the superintendent. They should watch the spray and rubbing machine operator work. If he is doing fine, tell him so. Talk things over with him. He may have some points on saving. Show him where he can make his work easier. Take your men into your confidence and see what happens. I have held a number of foremanships and have never had any trouble with help.

"Work for your concern. Do not be prejudiced toward any make of goods. They all have a merit. There are new products on the market all the time and if the one you are using does not fill the bill, try another or get the advice of the selling agent. Suppose you finish an article with three coats. Watch it dry. Then try some other product and use only two coats. If you find it just as good, use it and note how much you save your department. Your output is larger in less time. Don't get into a rut. Keep your eyes open and watch where you can save.

"When your agent comes in to sell you, tell him if your stain or any other material is not right. If it should be a deep problem, have the trouble man set you right. Use the products that you find on the pages of INDUSTRIAL FINISHING and you will be safe."

This declaration from a foreman finisher drives home ideas that merit careful thought and consideration by everyone who has anything to do with modern industrial finishing. Action and co-operation along the lines suggested will create better human relationships all along the way; better finishes and more satisfactory business dealings will result.

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Iron and Steel Corrosion—Coatings to Prevent It

An interesting and clear cut analysis of the causes and progress of corrosion on iron and steel surfaces, with suggestions as to kinds of coatings to use to prevent corrosion

By C. W. Richardson

AMONG the many questions connected with modern methods of manufacture, none perhaps is more important than that relating to the corrosion of iron and steel. It is a fact that the decay of iron and steel, if natural agencies are allowed to act on them, is far more rapid than that of wood and other building materials. Yet, if it were not for iron and steel, it would be impossible to create the masterpieces of engineering which we find on all sides of us.

Iron and steel are being used more and more in the manufacture of all kinds of objects, as well as in the construction of large buildings and other permanent structures such as bridges, gas tanks, docks, conveying machinery, etc., the permanence of which, to say nothing of the safety of the people in and near them, depends upon the success with which corrosion can be prevented.

Three theories have been advanced to explain corrosion, namely, the carbonic acid theory, the hydrogen peroxide theory, and the electrolytic theory. According to the carbonic acid theory, an acid (carbonic acid is sufficiently strong) always starts corrosion, causing a ferrous salt to be formed. Water and the oxygen of the air then react on the solution to produce ferric hydroxide which precipitates, leaving the acid free to attack a fresh supply of iron.

This theory falls down because it has been shown that iron can be made to rust in the absence of acids and even in the presence of hydroxides. Carbonic acid, or any substance which furnishes hydrogen ions, will greatly hasten corrosion.

According to the peroxide theory when iron, water and oxygen are in contact with each other a reaction takes place, forming ferrous oxide and hydrogen peroxide. The ferrous oxide then reacts with the hydrogen peroxide forming the basic oxide which in turn decomposes to form rust. Part of the remaining peroxide then reacts on the iron to form more of the ferrous oxide, which in turn is acted on by more of the hydrogen peroxide to form more rust. And so the reactions are continued indefinitely, the peroxide and water being regenerated and attacking fresh quantities of iron. This theory falls down because no trace of H_2O_2 has ever been found while iron is rusting. Also other oxidizing agents which destroy hydrogen peroxide do not prevent rusting, as does chromic acid.

It is now an accepted fact that corrosion is dependent largely upon "auto-electrolysis," that is, electrolysis due to currents set up between different parts of the material itself. In other words,

it is not necessary that an external source of electricity be provided before electrolysis can take place. These small currents require the presence of an electrolyte to serve as a conductor and thus complete the electric circuit. The moisture which is ordinarily present in the atmosphere is sufficient to close the circuit and start corrosion.

Once the circuit has been closed and the small currents start flowing, the oxygen of the air attacks the iron, forming the basic oxide commonly called rust. However, iron cannot rust in air or oxygen unless moisture is present; on the other hand, it cannot rust in water unless oxygen is present. Both oxygen and moisture are necessary for rusting to start, and these are always present in the air.

From the standpoint of the electrolytic theory, all iron and steel must be thought of as a composite structure, compounded of more or less well consolidated bundles of more or less homogeneous needles or units. Iron has a certain solution tension even when the iron and water are chemically pure. The solution tension is modified by impurities contained in the metal or the solvent.

The slightest segregation of impurities in the metal, or even the presence of unequal stresses and strains, will throw the surface out of equilibrium, and the solution tension will be greater at some points than at others. The points of maximum solution pressure will be electro-positive to those of minimum pressure, and a current will flow, provided the surface points are in contact through a conducting film. If the film is water, or is in any way moist, the conductivity will be high and the iron will pass into solution rapidly at the electro-positive areas, causing corrosion.

Even the purest water contains one gram of hydrogen ions in about 10,000,000 liters, and to this extent is an acid. In the presence of water iron goes into solution receiving an electrostatic charge from the hydrogen ions. For every exchange of static electricity between iron and hydrogen at the positive node, a corresponding negative hydroxyl iron appears at the negative node. In other words, as fast as the iron sweeps into solution the concentration of ferrous hydroxide grows.

It is at this point that the oxygen of the atmosphere, dissolved in the solution, reacts with the ferrous ions, oxidizing them to the insoluble ferric condition, which results in the precipitation of rust. After giving up its charge the hydrogen collects on the iron surface. The oxygen dissolved from the air then unites with the hydrogen to form water, which again dissolves more iron, and the entire process is repeated.

All investigators are agreed that iron cannot rust in air or oxygen unless water is present and on the other hand, it cannot rust in water unless oxygen is present. Unless moisture is present the iron cannot go into solution, and unless oxygen is present the ferrous iron cannot be oxidized nor can the hydrogen enter into combination with it to regenerate water.

Thus the corrosion can proceed only so long as the supply of oxygen lasts, even though moisture is present in large quantities. However, if rust once begins to form it will continue to grow by

making use of the oxygen and moisture over and over again, even if a good protective coating has been applied over it. It is very important therefore to have the metal absolutely clean and free from rust before starting to paint.

Coming to the paint aspect of the question, films which are porous and chemically unsaturated may actually accelerate corrosion. So soon as a piece of metal, painted with these substances, comes in contact with water after the abrasions of the paint film at any one point, electrolysis begins.

For example, the unsaturated nature of a linseed oil film will remove the hydrogen as soon as it is liberated, thus acting as a depolarizer and continuing the electrolysis at an increased rate. It has proven impossible thus far to find an absolutely non-porous film; a saturated one can be made by sufficiently baking any ordinary varnish. The porosity of a film may be reduced to a minimum by the use of certain pigments as loading materials and by carefully choosing the liquids used.

The problem of protecting iron, then, resolves itself into one of applying a coating which will prevent moisture and oxygen reaching the surface of the metal. A protective paint coating prevents corrosion just as long as it remains a dense, perfect coating, excluding all moisture. But as soon as it begins to break down, and pin holes allow moisture to penetrate, rust starts and spreads under the coating, expanding and pushing off the latter.

Furthermore, certain pigments act as excluders or moisture resisters, thus depriving the metal of the moisture which is essential to corrosion. It has also been found by tests that pigments vary in their inhibitive properties, the following list classifies the various pigments according to their rust inhibitive properties. Those pigments listed in the stimulative column should never be used in protective paints which are to be applied next to the metal.

While this list is classified as accurately as possible, it should be borne in mind that it is not inflexible. An inhibitive pigment, under certain conditions, may become a rust stimulative one, and a pigment, which under ordinary circumstances may promote rust, might be so manufactured as to fall into the neutral field.

It is interesting to note that

Inhibitors	Neutral Effect	Stimulators
Zinc Lead Chromate	White Lead (Quick Process)	Lamp Black
Zinc Chromate	Sublimed White Lead	Blanc Fixe
Zinc Oxide	Sublimed Blue Lead	Ochre
Zinc & Barium Chromate	Lithopone	Bright Red Oxide
Zinc Lead	Orange Mineral	Carbon Black
Chrome Green	Red Lead	Natural Graphite
White Lead (Dutch Process)	Litharge	Artificial Graphite
Ultramarine Blue	Venetian Red	Barytes
Willow Charcoal	Princess Metallic Brown	Prussian Blue
	Calcium Carbonate (Whiting)	
	Calcium Sulphate	
	China Clay	
	Asbestine	
	American Vermillion	
	Medium Chrome Yellow	

graphite has been shown to be a stimulator. This is due to its good electrical conductivity. Graphite has been condemned by the Master Sheet Metal Workers' Association as positively dangerous for application on metal roofs. Provided a coating containing rust inhibitive pigments is used as a primer, graphite may be used to good advantage in finishing coats.

Linseed oil and other clear coatings stimulate corrosion, once the surface is scratched to the metal. When the oil contains pigments there is a marked decrease in the power of the oil to act as a depolarizer. For this reason it is recommended that a prime coating containing an inhibitive pigment be recommended as a shop coat. The finer the particles of pigments the greater will be the protective power of the film, since the tendency of a pigment is to more or less fill up the interstices in the oil film and render it less porous.

Thus it appears that it is contrary to the best theory to recommend a clear coating next to the metal, because no evidence has been found to show that such a coating adheres more firmly than one containing pigment. In fact, many authorities claim that the sharp edges of the pigment, especially if of a silicious nature, will form a union with the metal and cause the film to adhere more firmly than if the pigment were not present. Furthermore, a film containing pigments which are excluders will stand up longer than the same vehicle used clear, because the pigment helps fill up the pores or interstices in the vehicle, and also helps to resist deterioration because of its water excluding properties. For these reasons, it does not seem advisable to use a clear coating as the finishing coat.

To sum up, then, the surface must be clean and free from rust. A priming coat made of rust inhibitive pigments and a vehicle which dries to a dense, close, nonporous film should be applied to prevent the inception of corrosion in the steel. A second coat should then be applied to protect the first from atmospheric and temperature conditions and to fill up thoroughly any vacancies or voids which may occur therein. To meet these conditions, the pigment should not be in the stimulative class and its particles should be extremely small. The ideal paint should be made of a varnish-oil vehicle of a chemically saturated nature, and should not contain a chemically active pigment, nor any strongly oxidizing agent in the way of driers.

Birch and Walnut.

To finish birch when it is used with walnut veneer, first coat the birch with a water stain, using walnut crystals for this purpose. These may be dissolved in warm water, stirring until they are dissolved; don't use hot water.

To finish walnut veneer alone no stain is required, but a little coloring may be added to the filler, employing black japan or asphaltum. If walnut and birch are together, then fill both at the same time with the one filler. When the surface is dry coat it with shellac, and body-up in the usual way for such work. Never use a pigment surfacer on these finishes; rub to a dull finish, or a polish, as required.—A. K. A.

Modern Equipment and Methods

Industrial Engineer shows how improved equipment and better methods have helped the finishing department in meeting the hand-to-mouth tendency in buying of furniture

By Chas. F. Scribner

TIME was when the furniture manufacturer considered business was good by the volume of unfilled orders on his books. Now it is considered a clear indication of poor management if goods are not on hand to fill current orders, or deliveries are not made as promised to the customer.

Influences of Today.

Better railroad facilities provide prompt delivery of raw materials and quick delivery of the finished products to customers; but if the orders do not go through the manufacturing processes on time, the next order is very likely to go to a competitor. Not the least in importance in bringing the furniture plant in line with the policy displayed by hand-to-mouth buying on the part of customers, is the adoption of modern equipment and better methods in the finishing department.

To progressive managers it has been repeatedly demonstrated that these factors decrease production costs, at the same time increasing quality and production volume. Some actual experiences in accomplishing such results by these means will prove interesting to the readers of this magazine in showing them how their own methods can be improved.

When the output of a well-managed finishing department, where planning and routing of the work has been adopted, is represented by 100 per cent, the normal output from a department where equipment is not kept in first-class condition, where workers are frequently absent, where materials are not provided when they are needed, and where work does not flow in a steady stream, is found by experience to range anywhere from 50 to 70 percent.

Planning and Scheduling.

Much of this loss can be saved by better planning, by anticipating requirements, and by not leaving difficulties to be overcome solely by the department foreman and trusting to luck.

Where a considerable amount of hard work is performed, and in the finishing department especially, there is a tendency on the part of the foreman to shift men from one job to another. This is wasteful because it multiplies the number of "stops and starts" made by the worker.

By properly planning and scheduling the work according to the output of the cabinet department and the productive capacity of the finishing department, then by training the foreman to watch the operations so as to make adjustments in sufficient time to avoid holdups, a greatly increased output is secured from a reduced number of workers, at less cost and with higher wages to the workers retained.

The diagram in Fig. 1 shows the results in reduced costs, in a

furniture plant finishing department, where planning and scheduling of the work was introduced and where the foreman was trained in the broader viewpoint of his responsibility—the getting out of work according to schedules. It will be seen that the cost of the work was reduced about 50 percent, after the plans were in full operation and had become thoroughly understood and made a part of the daily routine of those who were to operate them.

The Air Brush Indispensable.

No finishing department which is engaged in volume production can get along today without the use of the air brush for applying finishing materials. In applying stains, fillers, undercoaters, varnishes, and the newer pyroxylin finishes, such equipment has been found to give the following results in furniture production:

A. Produces a higher quality of uniform finish, free from runs, bad edges, thin spots and streaks.

B. Results in a greater material coverage than when the material is applied by hand-brush method.

C. Makes possible substitution of less experienced men, at lower wage rates, than where skilled hand-brush workers are required.

D. Reduces the amount of working space required for a given volume of output.

E. Insures cleaner and more orderly finishing rooms, better working conditions and reduces fire risk.

F. Gives a greatly increased output from same number of employees, at reduced cost for labor and material per unit produced.

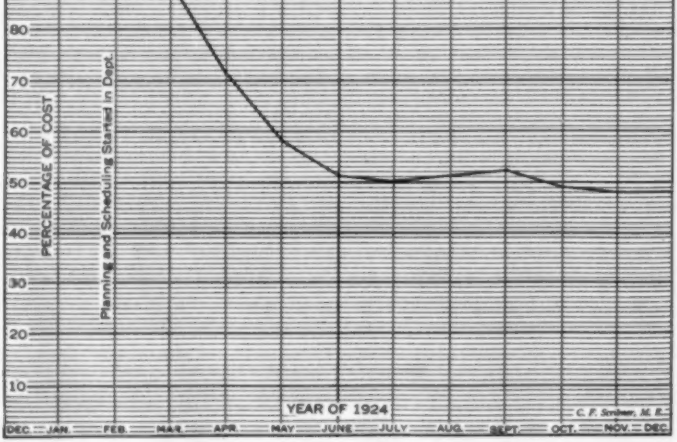

Fig. 1—Chart showing cost reduction in finishing department.

On the part of some old-time foremen there is a tendency to depreciate the importance of air-brush equipment in reducing the cost of finishing operations. A recent case which came under the writer's experience showed that this equipment was in operation only about half the time, the operator and his helper being employed the balance of the time in moving trucks, transferring work from one place to another, going after varnish over 800 feet away, and cleaning up the spray booth and its surroundings.

What Analysis Did.

The work was being done on a piece-work basis, the rates having been set by the foreman. As the operator was making wages which did not call for comment from the superintendent, no detailed study had been made of the work.

Finally, increasing business called for an extensive addition to the finishing department, and more equipment. At this time a detailed study was made of the possible capacity of the present equipment and the operating conditions in general.

The results of this study, in increase of output, higher wages to the operator and helper, and reduced cost to the company, are shown in the accompanying table.

Output and Costs—Air-Brush Varnishing.

	Before Analysis and Standardization.	After Analysis and Standardization.
Output per day	140 units	404 units
Hours required, 100 units	6.54-hrs.	2.22-hrs.
Hrly. Wage, 1 operator and one helper	$ .57	$ .71
Labor cost, 100 units	3.73	1.58

Further questions as to plant additions and investment in more equipment were settled by the results shown. When put into effect the methods showed that instead of a 35 percent output of what the existing equipment could produce, the larger output was easily obtainable when its most effective use was not left entirely to the foreman and the operator to work out as best they could.

No matter what labor-saving equipment is adopted for the finishing room, unless a very careful study is made of its use and steps taken to keep it in continuous operation, there is sure to be the question: "Does it pay?" Emphatically it does pay, but like any other piece of machinery its profitableness comes from its most effective use.

Improved Drying.

The time required for work to properly dry, after the finishing material has been applied, is a factor which greatly retards output in the average furniture factory. If there is not ample floor space for drying, output drops. When sufficient space has been provided to take care of output from the standardized finishing operation, the chances are that fixed charges on the space provided will be found to be very high. The practical answer to the question of more speedy and economical drying must be found somewhere between these two conditions.

To dry furniture after finishing in the least time, at the lowest cost, and with the highest quality of finished product, the room in which the drying process

is carried on must be conditioned. This conditioning calls for a practical consideration of the following factors:

1. The temperature of the room must be controlled within certain definite and fixed limits.

2. The humidity of the room must be controlled within certain definite and fixed limits.

3. The circulation or ventilation of the room must be positively controlled.

Consideration of these factors in the drying room of the furniture plant leads to the same solution as has been evolved in the textile plant—mechanical means for controlling temperature, humidity and circulation.

For the past several years there has been on the market just such mechanical means, and in every case where it has been installed the results secured have gone a long way toward producing a larger output at lowered cost. The use of such apparatus, at seasons of the year when atmospheric conditions outside retard the drying process—when orders cannot be filled because the product does not reach the shipping department according to schedule—has, in many instances, resulted in added profits sufficient to pay for the entire installation.

This is not surprising when it is realized that with the drying room properly conditioned, the time of drying can be reduced to one-third or one-fifth of the time required when air-drying only is available.

Coupled with the continuous operation of the air brush spray, the use of mechanical drying has been the means of securing an output far in excess of what was thought possible, and has led to the abandonment of plans involving the expenditure of considerable sums for plant extension and equipment investment which were not required.

Effect on Quality.

In a number of instances where such mechanical means have been considered, the question asked is: "What effect will it have on our quality?" The fact is that with such devices the quality is considerably improved, for the reason that the product is dried from the inside outward, while with varying atmospheric conditions the outside surface too often is found dry, while underneath the undried material has been "sealed" by the speed at which the outside has been dried.

Where the finishing department becomes the "choke point" in the production program, as it does when an increased output is required, the systematic introduction of modern equipment and its most efficient use, and the application of modern methods of scheduling the work of the department, can easily result in securing from 60 to 100 percent more output from the same floor space and the same number of employees.

Bronzing Routed Outlines.

Among furniture finishers who have fancy routed outlines to paint with gold bronze, there is still a difference of opinion as to which is the more satisfactory method of spreading the liquid gold-bronze—whether with a slender pointed brush or with a small oil can. Some use one method and some the other. Generally, each foreman finisher claims his method is the best.

As to the oil can method, there is perhaps some misunderstanding among those not familiar with it, as to just what kind of oil can is used. Let me say right

here, the kind of can employed makes all the difference in the world. A small sewing-machine can may be used but it is not the most desirable.

The can that gives best results, once an air hole has been punched in it near the base of the spout,

It's like tracing the line with a fountain pen —easy and rapid.

is the old regulation bicycle oil can. Such a can is shown in service in the accompanying picture. Its peculiar shape makes this style of can especially suitable for spreading liquid gold-bronze in the shallow slender grooves that trace plain and fancy patterns in the faces of some furniture pieces.

The air hole (it is about 1/32-in. in diameter) is center punched in the shoulder of the flask-shaped body of the can. Placing the finger over this hole stops the flow of liquid bronze through the spout of the can, even when the spout is pointing downward, because a partial vacuum is immediately created above the level of the liquid in the can. It's like holding water in a medicine dropper.

Workmen soon learn the knack of spreading liquid gold-bronze with these cans and, once they have the trick mastered, they find it easy to do clean accurate work and do it rapidly.—E. T. Sondhaven.

Holding Oil Stain Fast With Filling.

One of the problems confronting the finisher using an oil stain on open grained woods that require a filler is preventing the filler from dissolving stain and removing a part of it, thus giving the color a faded appearance.

To overcome this difficulty some finishers resort to filling the wood before staining, which is hardly a satisfactory way of doing it. We depend upon the stain to draw out the figure of the wood, and if the filler is first applied it seals the minute air cells of the wood and prevents proper penetration of the stain, the latter being forced to remain on the surface like a coat of shellac or varnish. Better than filling first would be to stain first then add a little stain to the first coat of varnish, or to the surfacer.

Still a better way is to stain first, and when the stain is dry apply a coat of very thin shellac, about 1½ lbs. to a gallon of solvent. This will be sufficient to set the stain so that the liquids in the filler will not dissolve it. If the shellac is sandpapered lightly with very fine paper it will greatly help in making subsequent coats smooth, and at the same time not detract from its effectiveness in holding the stain.—C. D. M.

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Lacquering Metal Specialties

Directing attention to some of the problems encountered in putting a lustrous lacquer finish on metal specialties, and revealing how they have been solved by one eastern concern

By Frank V. Faulhaber

CONSIDERABLE good work is often neutralized because of inferior finishing of one kind or another, and today much of the trouble revolves about the lacquering process. Until recently much of this trouble had long been in evidence in one New York city plant, but now the manager says that most of his lacquer worries belong to the past.

This concern manufactures metal specialties, many of which require attractive, long-wearing finishes. Most of the products are of brass; they are small but they require good luster and finish.

Combatting the Dust Nuisance.

The manager asserted that many of the lacquer troubles were traceable to dusty rooms. When the floors are dirty much of this collection is kicked up by workmen; open windows also are instrumental in causing dust to fly about. Open windows admit more dirt, and drafts cause a whirling about of dust that is already within.

Of course, during warm days the shop cannot very well close its windows, but the manager endeavors to solve the problem by confining the lacquering and certain other finishing work to set hours, thus reducing the annoyance.

The plant is small, and not equipped with any modern dust-collecting devices, but since all the men give attention and thought to the matter, their cooperation helps materially. For instance, doors, opening to other rooms, are kept closed. Open doors often cause drafts, which start dirt and dust in motion; they also affect the drying operations.

Sweeping is usually attended to at the close of the day's work to insure a clean shop for the following day. The manager believes that a clean, inviting factory inspires the men to do still better work. This is of particular import insofar as the lacquering is concerned.

Clean Surface Essential.

The manager oversees much of the work himself, insisting that the metal plates and other specialties are clean—that is free of finger marks, cracks, spots, oils and other defects or foreign substances. The smallest mar often spoils an otherwise good piece of workmanship; neglect here would probably necessitate throwing the piece into the discard.

Damp weather usually brings on additional finishing room troubles. However by assigning responsibility to one man, the manager stated, the trouble to an extent has been overcome. This man is an experienced worker, fully conversant with the whims of finishes on damp and rainy days. On such days he sees to it that his products are extra dry; there is less haste and more time is allowed to make sure that

everything is just right. Naturally the plant is profiting by taking such precautions.

Use Good Equipment.

This manager declares that it pays to use only the best and most modern spraying equipment, since faulty apparatus brings about more lacquering troubles than some finish users realize. Supplementing the good lacquering equipment, there must be an efficient operator—a man who has a real interest in his undertaking and one who gives some time and thought to the solution of his problems.

Much Depends Upon Workmen.

The type of workmen who are entrusted to do lacquering is always a matter of importance. This concern had encountered many troubles along this line, too. Formerly the help was of a cheaper class, the man then in charge putting on young fellows who knew nothing at all about lacquering, or the operations and processes employed to get out the work. Breaking in this help entailed a considerable amount of time, money, patience and worry; and then the management was always confronted with a big problem that was never fully solved.

Now, all this has been done away with. There are no more floaters in the crew. Experienced lacquer men are assigned to the work—men who are really interested in what they are doing. They cost a little more in wages but they are worth it. Previously, there was considerable spoiled work, aside from all the other annoyances, but now this seldom occurs.

Do Some Experimenting.

The manager believes in experimenting with different lacquers when he is casting about for better finishes. He points out that this is one inevitable solution to lacquering and finishing problems. He tries—and finds out.

Even when a plant has hit upon what may be considered the best lacquer, it is still worth while to experiment some along other or similar lines. Different manufacturers have developed different lacquers, and different lacquers solve different lacquering problems.

On extra high-grade work involving fine finishes, the lacquer is put on in two coats, each one being allowed plenty of time to dry after being applied. This reduces the possibility of tarnishing to a minimum, and the work stands up well in other respects.

Breakfast Room Furniture.

During the past two or three years there has been a steady demand for a wider range of colors for breakfast room furniture, and it is impossible to list all of the different color combinations that are now in use. However, ivory and grey are still the most popular basic colors. These, used basically and striped or otherwise decorated with brown, gold, yellow and sometimes black and blue, produce beautiful effects. Blue, especially delft blue, decorated with gold, orange, black, red and many other colors that will pleasingly contrast with blue, is also very popular. Other colors are tan, green, orange, mahogany, brown and black in various combinations.

Decorating is done by striping, high lighting, or by having a design stenciled or painted on the furniture. High lighting is obtained by using an enamel long

enough to apply and then wipe the surface, leaving the color in the crevices. Either enamel or paint can be used for stenciling, although paint seems to be preferable.

Of course, the first process in the finishing room is to apply an enamel undercoat which covers the surface of the wood and gives the enamel something to cling to. In most cases the spray machine is used to apply the enamel. The most important requirement of a

A painted breakfast table stenciled at corners of drop leaves.

breakfast room enamel are its weather and water resisting qualities. It is desirable to have a good enamel that is quick drying and that dries with a hard tough surface. It must also possess elasticity.

Some manufacturers make fibre breakfast room suites and in this case great care must be exercised in the selection of the enamel, because enamel for this purpose must possess greater elasticity than when used on wood. The twisting and bending of the fibre has a tendency to chip some enamels from the surface.—Marietta Message.

The detection and elimination of waste is one of the first principles of good business.

The Penetrating Oil Stains.

The chief evil in using penetrating oil stains lies in the fact that it is used on work exposed to bright light—yes, and I might say the direct rays of the sun, thereby causing it to fade. Another evil in not equalizing the tone properly is in the handling of the stains. It is really surprising to find the many shades of color that can be gotten out of one pail of stain, and especially so with inexperienced help.

In using penetrating oil stains, apply the stain to the lighter woods in the piece first; then stain in balance on work, wiping the darker pieces first and then wiping the lighter parts. Better still, on these light pieces, just an even blending with a duster will be sufficient to match the balance of stain.

At this point a word might be said in regard to filler. Before filling over oil stains, spray or brush on a full even coat of shellac size. Do not sand this but apply filler over this coat of size, after which, when it is dry, sand the surface and apply shellac, lacquer or varnish coats.—Edw. C. H. Rottmann.

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Piano Finishing—I

Piano finisher foreman stresses importance of starting right with a smooth surface in the white, and explains some of the finer points in the staining process

By Leonard S. Decker

IN PIANO finishing one of the most important things is to start right on each process. Do not begin in a shiftless way, letting this and that thing go, thinking it will come out right in the end, for it will not. See that when your raw material comes from the cabinet room the wood is sanded to a glass surface. If you finish over scratches in the wood you will have bad results.

Next look for bruises in the wood. Take these out by soaking pieces of blotting paper in water and laying them over the bruises. Then heat a putty knife hot, but not red, and put on top of blotting paper. The heat and moisture will bring the depression up even with the surface. When the raised bruise is dry, sand it smooth. Next and of great importance, look at all joints for glue, for this is a varnish killer.

A grand piano in figured wood.

Our next process is staining. This must be done with care to get a uniform color. There are several methods of staining, but water and oil staining are the most common. I prefer water for mahogany, walnut and gum, as it gives a richer appearance when finished. Oil stain is best for oak.

Where we are apt to make a mistake, is by not letting the article stand long enough after staining. By standing over night it may feel dry on the surface but it will be moist in the pores.

For water staining the stain should be heated warm. You can use it cold but it will not penetrate so quickly. Sponge off one piece with water, using the sponge moist—not soaked. Then sponge on the stain, going with the grain. After staining, wring out the sponge and go over the surface lightly to pick up the heavy spots of stain so as to leave it uniform.

It is best to buy your stains in powder or in oil from your color manufacturer. The manufacturer will tell you how many ounces to a gallon of water, or how much turpentine to a quart of oil stain. It really does not pay to make your own stains. If you use industrial stains, the firm manufacturing them stands behind them, and is always ready to give you any help you may need.

For instance, suppose you were staining and you dipped your work in a tin tank and sponged as I have just directed. You might have a nice color. But perhaps the next day you stained and your work was a cloudy brownish red. Of course you would look for the trouble. If you could not find it, you would report it to your color house and as soon as your letter arrived their trouble man would start on his way to assist you. He may say your tank is dirty.

"Oh, no," you reply, "I cleaned it only a short time ago." So you empty it and he shows you rust on the interior of the tank. You had not given that a thought. He has taught you something and has come a long way to do it but it has not cost you a penny. So we have these firms to thank for helping us.

Now after the stain is dry, sand with fine sandpaper to remove the fuzz. Do not cut the edges or surface. When edges are cut, touch them up again with stain. This applies to all wood.

When using oil stain, apply it with a brush and let it stand until the wood has absorbed as much stain as possible. Then take cloths and wipe it off.

Freeing Airline of Moisture.

During the warm, humid weather of summer is when the spray operator has his share of trouble due to moisture getting into the air-line and causing the varnish to pit. If he is using shellac, the trouble is apt to be revealed as little white specks which show badly after the stock is varnished. White specks are very apt to show in certain kinds of varnish, especially the cheaper grades.

Every spraying equipment should have condenser to remove moisture from the air. Even then there are times when the air is so heavily charged with moisture that the condenser becomes overloaded. To overcome this difficulty, an auxiliary condenser should be provided through which the air will pass before it enters the spray line.

This condenser consists of a cabinet filled with pipes through which cold water runs. The pipes should be so arranged that all the air will come in contact with some of them. As the air strikes the pipes the moisture in the air condenses through the lowering of its temperature and falls to the bottom. The bottom of the cabinet should be open for the air to enter and the moisture to escape. A drain should be provided to carry the water away.

This system will relieve the air of the great bulk of its moisture, but it may lower the temperature of the air below what is required for good spray work. This difficulty can be overcome by placing between the condenser and the air pipe, a conduit of sufficient size to hold a small electric heater. After the air is freed of moisture, it is warmed as it passes along the conduit past the heater to the airline of the spray.

It might not be necessary to use this auxiliary condenser throughout the entire year, although in seasons and localities when and where the humidity is very high, it might seem to be needed all the time. However, since its operation is inexpensive, its use at all times would add a margin of safety and preclude the possibility of trouble such as results from moisture in the airline.—P. T. Boehmer.

Staining by the Dipping Method

Calling attention to the possibilities of dip-staining and stain-room ventilation, and describing the construction and operation of dip-staining tanks as used in modern factories

By Maurice M. Tyler

EVERY finishing room has a great deal of staining that can best be done by dipping. Of course, there are some things which it is not advisable to dip. For instance, it is not advisable to dip large pieces of oak in an oil stain. This wood is so porous that it would absorb a great amount of stain and the surface would require a long time to dry. Often walnut, mahogany and birch can be dipped to good advantage.

Starting with the making of the tank, this must be plenty large enough to accommodate the largest stock to be dip stained. Another reason for having a roomy tank is the lessened danger of damaging the stock. If heavy pieces, such as dressers, buffets and wardrobes are to be dipped, an overhead carrier should be provided for handling them. The carrier should be arranged to convey the stock over a drain which is wide enough to catch all the drip, and turn it back to the tank.

If an oil stain is used it is important that suitable ventilation be provided to carry off the fumes. It is not always possible, nor practicable, to place a fan immediately above the staining tank. The fan may be located anywhere, but its suction pipe should reach back to the place where the fumes are in greatest volume. This pipe should be closed at the end and then fitted with smaller branch pipes to give a more even distribution of suction.

There are several reasons why the dip-staining department should be well ventilated. In the first place, it is in the interest of the workmen's health. No man can stand to work in a dipping room for any great length of time if the room is not well ventilated. In the second place, good ventilation is essential to good production. Men working under conditions which are inimical to health are at a disadvantage, and production will drop accordingly. Where men are working under such conditions the quality of the work is inferior. I have seen men working under such conditions.

Most of the oil stains contain considerable quantities of benzine, naphtha, or other similar liquids that are highly volatile; fumes from these are about as dangerous as gas. I have seen men work under these conditions and become as drunk as though they had been drinking hootch. I have seen men knocked out so badly they had to be carried into the open air to revive. These things happened in the days before the electric fan and modern ventilation methods. There is no excuse today for such conditions in any shop; no excuse for any fumes being allowed to spread throughout the shop. A ventil-

ating system, if properly arranged, will remove all the fumes.

If a water stain is used the dipping tank should have a heating system to keep the stain warm and at a uniform temperature. Warm stain takes to the wood better than cold stain. If a large piece of wood is dipped in cold stain, and not allowed extra time to soak, there will be a perceptible difference between the shade of the top edge and that of the edge where the surplus stain last left the wood. The reason for this can be readily understood.

Surplus stain leaves the top edge immediately after the wood is raised from the stain, and the liquid flows toward the lower edge, thus giving the lower edge more time to absorb it. True, it is only a matter of seconds, but the difference in time is sufficient to make a perceptible difference in the amount of stain absorbed, and in the depth of color. In a measure, the same is true of warm stain but not to the same extent. If the stain is warm the surface of the wood immediately takes up its fill, and deeper penetration takes place more slowly. Then again, warm stain flows off more rapidly than cold stain. Thus the more rapid penetration of the surface and the more rapid flow of the surplus stain—these two combined factors tend to give a more uniform penetration and more uniform depth of color.

Warm stain has one other advantage in making a uniform color. Every stainer, no matter how he applies stain, finds some spots where the stain does not take as readily as it does on others. Usually this is due to oil that has come in contact with the wood from the hands of those who have handled it. The hands of every man are more or less oily; some are very much so. Where human hands touch the wood, an oily spot is left, and it is more or less difficult to penetrate with stain. When stain is applied with a brush an extra stroke or two with the brush will cut through the oil. If the wood is dipped in a cold stain the liquid flows off the spot before it can penetrate the wood. If the stain is used warm, or hot, the rapidity of penetration is in proportion to the increase in temperature.

Owing to its more rapid penetration, a stain that is used at a high temperature does not need to be as strong as a stain used cold. For this reason consideration must be given to temperature when preparing the solution for use, otherwise the color may be too dark.

A water stain vat should be surrounded with a water jacket, so that the temperature of the water can be raised and kept uniform by means of steam. There are two ways of holding the water in the water jacket to the desired temperature. One is by means of a coil of pipe at the bottom of the water jacket. The other is by turning steam directly into the water. The latter is the better way because it is quicker and there is less waste of steam. When steam is turned directly into the water, an overflow pipe must be provided to carry away any surplus water which may accumulate through steam condensation.

The way to make a stain vat with a water jacket is to make two vats. One should be small enough to go inside the other and leave about 6-in. of space under the inside vat, and 1 or 2-in.

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around the outsides for the water. The inside vat must rest on a framework in the bottom of the larger tank. The outside wood tank is lined with metal.

The steam pipe enters at one end near the bottom of the outside tank. One end of the pipe is closed, but the pipe contains small holes at intervals of 2-in. to permit an even distribution of steam throughout the tank.

It is a good plan to have the water jacket fitted with a thermometer in order that the operator can maintain a more uniform temperature than would otherwise be possible. I have found that a temperature of approximately 140 degrees F. is about right for water in the jacket, the stain, when dipping is in process, will be 10 to 15 degrees less than this. After the steam is turned into the water jacket some little time must be allowed for the stain to become heated before operations begin.

The stain vat should be cleaned out at frequent intervals. The wood articles that are stained carry a quantity of dust which is washed off by the stain and which finally settles to the bottom of the vat. The top stain should be carefully drawn off, and the residue thrown away. Never stir the stain from the bottom; if you do, this accumulation of wood dust will gather on the wood surfaces and cover them with small specks.

Hard Wax Finish.

In giving instructions for wax finish, such for instance as a wax finish on turnings produced by the tumbling method, paraffin wax is usually recommended. Now this wax has one objectionable feature; it is soft and is apt to be affected by high temperatures, and even by handling.

A harder and more durable finish is produced by carnauba wax. This wax is a vegetable product obtained from the Brazilian wax palm tree. It is hard and brittle, and because of its hardness makes a very durable finish. If need be, it can be mixed with paraffin wax by melting the two together in any desired proportion. By melting this wax and, while it is warm, adding one percent of linseed oil—stirring both together and then cooling—you will remove some of its brittleness without in the least interfering with its durability.

After it is cold it can be broken into pieces of suitable size and used in the tumbler with the turnings to be finished. A slightly larger percentage of linseed oil may be used with this wax if desired, but if very much more is used, a little time should be allowed for the finish to harden in the air, after the turnings are taken from the tumbler and before they are handled very much.

A good-wearing floor wax can be made by melting together under heat, equal parts carnauba wax and cerosene wax; just before the mixture begins to harden add an equal quantity of turpentine, or one of its substitutes. Some finishers add a small quantity of paraffin wax to the mixture, but its wearing quality is reduced in proportion to the percentage of paraffin used.

For use on furniture the proportions may be as follows: 2 lbs. paraffin, 1 lb. cerosene, ½ lb. carnauba. This makes a very good furniture polishing wax. It is prepared in the same way as for floor wax.—J. K. M.

Industrial Finishing

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Business Progress.

Business in general appears to be good but not spectacular—not booming. So far this year most lines of business have shown gains, but conditions have been such as to discourage possible over-production. As a result there has been greater stabilization in prices, and manufacturers have turned more attention to means of economizing their processes and of improving the quality and appearance of their products rather than of disregarding these features in a mad race for volume production.

This is a healthy condition! It shows progress of a higher order. Manufacturers have more time to investigate new products and improved methods. A better class of employes are retained on the payrolls of industry, and an improved type of business management and salesmanship is developed.

Hues, Tones and Shades.

With more and more of what some are inclined to call "gaiety" as the predominating keynote of color decoration in furniture, furnishings, automobiles, etc., there occurs with increasing frequency occasions for using such terms as "tints" and "tones," and "shades" and "hues."

Now it is reasonable to assume that many foremen finishers and perhaps some decorative painters are at a loss to explain just what differences, if any, exist in the exact meanings of these words. No one of these terms means exactly the same thing as any other term although we often hear two or more of them used interchangeably as though they meant the same thing.

An authority on colors defines colors, and what pertains closely to colors, as follows

PURE COLOR.—One that cannot be formed by any combination of other colors, for example red, blue and yellow.

NORMAL COLOR.—A color formed by a combination of two or more colors, and one which may be selected as a foundation of a scale of tones.

TONE OF COLOR.—Designates the condition of any pure or normal color which has undergone a modification by the addition of white or black.

TINT OF A COLOR.—This term is applied to an admixture of a pure or normal color and white, in any proportion. A tint, therefore, is a light tone of any color.

SHADE OF A COLOR.—Designates an admixture of a pure or normal color and black in any proportion. A shade is, accordingly, a dark tone of any color.

SCALE OF A COLOR.—This term is employed to designate a graduated series of tones of the same color, extending from the lightest tint, through the pure or normal color, to the darkest shade.

HUE OF A COLOR.—This term designates the modification which

a color undergoes by the addition of a comparatively small proportion of any other suitable color. This involves a departure, more or less pronounced, from its original scale.

A Broadening Influence.

Many finishing room foremen keep too close to their departments, to their own loss. Are they broadening out? The executive who confines himself too closely to his own work, to his own department, and to his own factory, is really confining his abilities. Consider the disadvantages of that!

The executive is not only confining possibilities so far as he himself is concerned; he is limiting activities of all those under him, and that is more serious than may appear at first thought. The quality and the quantity of the output is hindered, and, in fine, the whole plant is held back —the factory cannot be said to function efficiently and progressively, nor most profitably.

He Might Solve Your Problem.

Knotty problems often crop up in the experience of every finishing-room foreman, and particularly the old-timer well realizes how speedily these sometimes are solved by persons seemingly unversed in the trade. A minor employee may be at work for you, and he may be the last one you would think of consulting; yet it is only the part of wisdom to leave no stone unturned in striving for a solution to difficult problems.

Bear in mind, the hardest subject may be mastered by people apparently not in the know, yet who have ideas. And it is ideas you want, whatever the source.

Every foreman of furniture finishing will do well to anticipate the trend of present and future finishes, and do some investigating on his own initiative. Knowledge along this line will be beneficial in more ways than one. Not only will it benefit a foreman in the actual performance of his work in the finishing room, but it will be of immense value to him in his contacts with those executives of the company whom he is obliged to please, and in his talks with the salesmen of his firm and the representatives of the various finish manufacturers.

When a foreman finisher is called into consultation about new finishes, or finishes for new articles in the line, it will add substantially to his prestige to be able to talk as one who is informed on certain fundamental characteristics—and some of the finer points, too—regarding suitable finishes for the style and period of furniture under discussion.

Be Prepared—Be Informed On Period Styles and Finishes.

The increasing popularity, and in turn the increased production, of good furniture made and finished in period styles, places upon foremen finishers in the furniture industry an obligation to acquire definite information regarding what is correct in colors, characteristics and appearances of finished surfaces on these articles. The foreman finisher, like the artist must have a clearly defined mental picture of what he intends to produce before he obtains or prepares his materials, and sets in motion the various operations which are to constitute the finishing process.

Surfacing Materials for Automobile Lacquer Finishes

To obtain an attractive and durable lacquer finish on automobiles the primer and surfacing materials must be properly designed and applied under suitable conditions

By R. L. Masterson

IN FINISHING automobile bodies with lacquer materials, a great many systems are used. All of these systems require some sort of primer and surfacing materials for filling imperfections in the metal and for forming a bond between the lacquer and the metal. These priming and surfacing materials are of three main types.

First, there are baking paint primers and surfacing materials which are baked at various temperatures and for different lengths of time, depending upon the equipment in the finishing room, a common temperature being around 250 deg. F., for a period of five hours or so.

Without a doubt, when these paint undercoats are properly designed, properly applied and properly baked, they form the best type of undercoater for lacquer enamel because: (1) they fill the imperfections of the metal quickly, (2) they rub down to a very smooth surface, (3) they resist the solvent action of the lacquer and therefore hold out the lacquer coats to produce a smooth finish, and (4) they are thoroughly oxidized by the baking process and will not undergo rapid changes after the car is in service.

Owing to the fact that many shops have no baking equipment and because, for refinishing work, the upholstery, the grease and oil and other parts of a fully-assembled car will not withstand such high temperatures, it is necessary to use a second type of priming and surfacing materials.

Air-Drying Paint Coats.

These consist of air-drying paint coats which are built very much along the same lines as the baking products, except they are shorter in oil content and consequently are not so tough nor elastic. They are more prone to soften under lacquer solvents; they are more likely to be not fully oxidized before the lacquer is applied, consequently they undergo a change after the lacquer enamel is on and they do not adhere as tenaciously to the metal. However, when air-drying paint undercoats are properly designed by reliable paint makers, they produce a very good finish under lacquer enamels.

It is of importance that these air-drying paint undercoats be made especially for use under lacquer. The mistake should not be made of attempting to use under lacquer priming and surfacing paint materials that were designed for use in the color varnish days. It might be that these old-type primers and surfacers would give good results; in fact, some of them do, but the possibility of danger is much greater than where the paint undercoat

materials have been especially designed for use under lacquer.

'Cellulose Lacquer Base.

The third type of surfacing materials are built on a nitro-cellulose lacquer base. Some systems call for the use of a nitro-cellulose lacquer primer as well as a nitro-cellulose lacquer surfacer. We feel that it is not advisable to use a nitro-cellulose primer next to the metal, for the reason that a nitro-cellulose film will not adhere to the bare metal as well as a paint film of the proper construction.

Furthermore, it is of extreme importance that the metal surface be entirely clean when the lacquer primer is applied in order to get any adhesion at all, otherwise there will be chipping, peeling and other defects which will develop after the car is in use and subject to vibration. The difficulty comes in getting the metal entirely clean.

Often the metal appears clean when in reality it has small traces of grease or other foreign materials on it and unless these are first removed, lacquer materials will not adhere. A paint primer, on the other hand, tends to counteract any small traces of grease that might be on the metal and for this reason it minimizes the possibility of trouble from this source.

Provided a good bake paint primer or a good air-drying paint primer is used next to the metal, surfacing materials built on a lacquer base can be used to advantage, because they dry quickly and adhere firmly to the paint primer and they form a natural bond for the lacquer enamel. They are built on practically the same base as the lacquer enamels, consequently they expand and contract in approximately the same degree as lacquer enamel and do not easily check or crack. The disadvantage in the use of lacquer surfacing materials is primarily from the production standpoint rather than from a wearing standpoint; they do not build up imperfections in the metal as quickly as a paint surfacer, and they require a little more time to rub to a surface.

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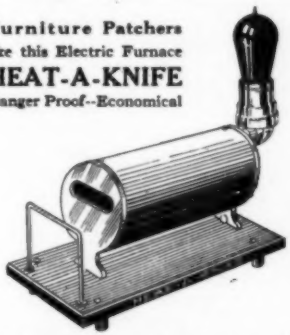

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$2.00 extra for red light current heat indicator attached. F. O. B. Chicago.

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A new adjustable handle rest prevents wooden handle of knife burning while being heated. A rust-proof and scale-proof oven is mounted on an asbestos base. Furnace is strong, solid and well made throughout. No. 51 or 52 oven has knife opening 2¾" wide, ¾" high, 7⅛" oven. No. 5 or 50 is 1⅛"x⅛"x5". Both complete with cord and plug.

BOBBETT ELECTRIC MFG. CO.
815 E. 43rd St., Chicago, Ill. Tele. Oakland 1252

Some motor car manufacturers use one of these systems, some another and perhaps a few use a combination of the three types. In the automobile refinishing field the same holds true. In a few cases it has been found advisable to use a coat of paint primer followed by: (1) one coat of paint surfacing material, (2) dry sanded to a surface, (3) fill the worst imperfections and (4) two or three coats of lacquer surfacing material which is wet sanded.

Never Mix Different Brands.

It is a serious mistake to mix up undercoating materials of different manufacture in building a lacquer finish. Some people make a practice of purchasing their surfacing materials as well as lacquers, from various sources of supply where they can obtain the best price. They receive what they believe to be the best quality for their money. This means, the primer may be a very good primer within itself but the drying time, length of oil content and other properties may not be exactly suitable to the surfacer and other coats which are applied over it.

In the same way, the surfacer may be a good surfacer within itself, but it may be either too short or too long in oil content, or not otherwise exactly suited for use over the primer or under the coats that follow. The result may be that when expansion or contraction of the metal takes place, under sudden changes of temperature, one or the other coats may not be sufficiently elastic to withstand the strain. As a result checks, cracks and other defects will form.

It was bad enough to mix materials of different manufacture in the color varnish days, but the danger is even greater with the use of lacquer finishing materials because the undercoats, in addition to working well with each other, must withstand the solvent action of the lacquers applied over them; they must work in conjunction with the lacquer enamel to prevent defects showing up later.

Use a One-Brand System.

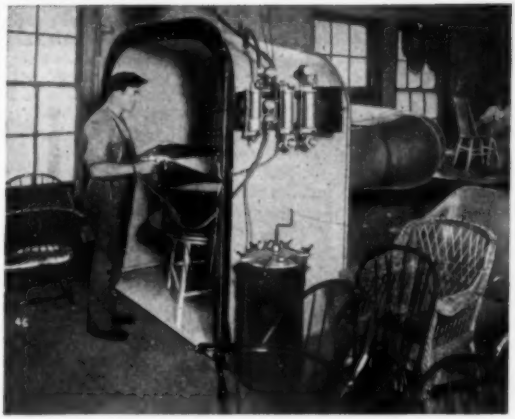
It would be much better for each motor car manufacturer and each automobile refinishing shop to purchase all of their finishing materials, to be used on a given job, from the same source of supply so that the manufacturer could furnish the material for each coat of such a quality that it would be well suited for its particular use, and work in harmony with the other coats below or above it. One or two of the larger manufacturers of lacquer and paint products have complete systems of this sort from the metal out to the finishing coats and have carefully designed each material to fit in with all the others.

Consulting an "F. D."

One or two of the leading motor car manufacturers have realized that the painting of an automobile must be reasoned out along scientific lines and that a "Doctor of Finishes" is needed to diagnose and correct paint and varnish troubles, as much as a Doctor of Medicine is needed to diagnose and correct human ills. They have turned over their entire finishing problems to reputable paint and varnish manufacturers. The makers of these materials should be better qualified than any one else to specify the type of goods to be used, methods of application, and conditions under which they are to be dried.

By following this procedure the proper materials are applied next

PEERLESS SYSTEMS



SATISFACTORY finishes can only be produced with properly designed spray equipment. The PEERLESS SYSTEMS has established an unparalleled reputation for not only speed and economy of operation, but also an unequaled quality of finishes.

The PEERLESS SYSTEMS consists of the most up-to-date equipment, designed from a practical standpoint, both as to the application of the materials and the economy of operation.

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Write for Literature—New Bulletin No. 25A

PEERLESS PNEUMATIC SYSTEMS, Inc.

Manufacturers of Complete Spray Finishing and Painting Equipment

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PEGEX, Pyroxylin Lacquer, the remarkable furniture finish, is manufactured under rigid chemical control. This scientific care assures maximum durability with perfect uniformity. Every batch before shipment must pass the most searching laboratory tests. Record samples are kept, enabling the duplication of all succeeding shipments.

This unvarying high standard in quality gives the assurance of a perfect finish—one that retains its satiny beauty over a long period of years.

PEGEX is recommending itself with increasing force as a *dependable* finish.

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PEASLEE-GAULBERT CO., *Inc.*
LOUISVILLE, KY.

NEW No. 136

THREE VITAL QUESTIONS:

How will it improve your finish?
How will it hasten your output?
How much will it reduce costs?

If you will write us we will give you the benefit of our experience in industrial finishing problems.

The Thibaut & Walker Co.

MANUFACTURERS
Varnishes, Air Drying and Baking Enamels
Black Baking Japans
72-76 NINTH ST., LONG ISLAND CITY, N. Y.

to the metal and the other coats are properly related one to another so as to give good working conditions under production and, at the same time, maximum durability after the job is on the road.

Foundation Important.

The advantage of one brand of lacquer over another involves the question of application, rubbing and polishing, as well as the construction of the material itself. The finished result lies not alone in the lacquer enamel, but also in all of the coats underneath it—according to how they are constructed, how they are applied, dried and surfaced. The finish on an automobile may be likened to the case of a fine house built on a pile of sand. If the foundation is not properly designed and built of the right materials, laid under proper conditions, the house will be neither dependable or permanent. So it is with the finishing coats; no matter how good they may be, they cannot last if they are not on a good foundation.

Questions and Answers

This service department is conducted to meet the readers' need for prompt information on specific problems, and to give others an opportunity to review the questions and to offer comments, suggestions or answers

Wants High Gloss on Hickory Handles.

We want to get in touch with some one who can furnish us with a dipping or spraying device that will put a high gloss finish on hickory handles, axe, pick, sledge, hammer, etc. Would be pleased if you could furnish us this information on same. What we want is something that is an instant dryer.—M. H. Co.

Refinishing Baked Enamel.

We have experienced some difficulty in finishing over baked enamel fenders. What would you advise?—B. B. Co.

You do not state just what the difficulty is, nor how you are finishing over the old enamel fenders. Considerable depends on the condition of the old finish; if old and dulled or checked, rub down, apply a coat of black primer and a coat of long-oil black air-drying enamel. If the fender requires only patching here and there, sand smooth and apply the enamel direct.—I. F.

Finishing Fire Fighters.

Can you give us some suggestions as to the best way of cleaning our extinguisher preparatory to spraying with pyroxylin finish? Our machine is made entirely of brass and is assembled with the exception of the gauge before the cleaning process.

Also, can you suggest a durable finish in the way of a lacquer which will give the machine a uniform coating in imitation of brush brass, and not be excessively expensive.

The tubes forming the chemical and air chambers of our extinguisher are of drawn brass tubing, one of which is coated with 50-50 solder, the other being

Increase Production

AND

REDUCE COSTS

WITH

VITRIC

Makes a Surface Like Glass

Sprays freely
Rubs easily
Does not bloom
Resists moisture

Apply two coats in one day and get a LACQUER FILM at ONE-HALF THE COST

A MONEY MAKER for you if you want SPEED and LOW COST

Samples sent on request

Finishing Products Co.
13th Street and Sherman Drive
INDIANAPOLIS, IND.

left in its original state. The castings are of brass, and of course, a somewhat different shade or color than the tubing.

We should like to coat the whole machine with some mixture as described above, so that it will have a uniform brass color.—F. R. X. M. Co.

As a good cleaning solution we would suggest a mixture of benzole and acetone, approximately two parts of the former to one of the latter.

As to a finishing lacquer to give a brush brass effect, we would say that if your machine is already made of brass it would be best to sand with fine sandpaper in straight lines and then apply a coat of metal lacquer which will keep it uniform as to color and protect the surface against tarnishing.

As for the two shades of color, it would be difficult without seeing them to suggest how one surface could be toned to harmonize with the other. The best method would be to send a sample of each to a reliable manufacturer and let him work out something for you.—I. F.

To Fill Nail Holes.

Will you please advise us the best kind of putty that can be used for puttying nail holes on dark golden oak, black walnut and mahogany?—O. Casket Co.

The sort of putty you desire may be readily made up from any of the patching plasters now on the market. Some of these are really nothing more than plaster paris with ingredients added to retard setting.

To color to a golden oak shade, add burnt or raw sienna; for

walnut, Van Dyke brown; for brown mahogany, burnt umber; for red mahogany, rose lake.

We presume the character of the work is not so particular as to require the use of cement sticks, which are customarily used for furniture patching.—I. F.

Why Paint Stays Sticky.

We are manufacturers of revolving clothes dryers, and do all of our painting by the dipping process.

We paint the arms yellow and have been experiencing a lot of trouble by the paint remaining sticky; it leaves finger prints and mars easily. What we are after is a hard smooth finish and would appreciate it very much if you can give us some guidance in the matter.

At the present time we are using Government paint which we are thinning with linseed oil, turpentine and dryer, giving the material two coats. Would it be cheaper if we bought white lead and mixed our own, or will ready-mixed paint go just as far?

In regard to the paint drying sticky, we think it possible that we may have gotten a poor grade of oil; would this cause it? As these are yard clothes dryers, outside paint must be used.—R. M. Co.

We believe your difficulty is traceable to the use of linseed oil paint. The grade of linseed oil you are using is no doubt all right, and white lead paint would probably not give any different results.

Our suggestion would be that you first dip in a lithopone base primer or undercoater, tinting if

Mac-Lac White Shellac

Manufactured only from

Pure Orange Shellac

Imported direct from India through our Calcutta house, direct to our factory in Rahway, N. J.

An experience of twenty-five years actual bleaching shellac warrants us in assuring buyers we have the knowledge and the talent for producing this highly technical product, which is appreciated and desired by the trade who want the best.

Western buyers who are dissatisfied with white shellac generally, we recommend to send for samples of white shellac gum, or white shellac varnish, to

M. L. BARRETT & CO., 233 W. Lake St., Chicago
C. E. FRANCHE & CO., 440 Orleans St., Chicago

We do not make varnish, but will be pleased to send samples of the white shellac gum on request.

We are also manufacturers of refined white shellac for the manufacture of French varnish or lacquer work.

Address all communications to our New York Office,

THE MAC-LAC CO., Inc.
11 CLIFF ST., NEW YORK, N. Y.

DON-O-LAC

has every quality that goes to make up a perfect wood finishing agent. It is an excellent builder, sands beautifully and has the appearance of pure cut shellac.

It Mixes Perfectly With Lacquer
In Any Proportion

For use under varnish, Don-O-Lac is especially desirable. Its elasticity prevents checking and cracking due to fluctuating atmospheric conditions.

DON-O-LAC COMPANY
770 Exchange St. Rochester, N. Y.

desired, to a yellow shade with japan color. This should dry over night so that you can dip the next day in a yellow color varnish. Both of these materials should cost considerably less than the yellow paint you are using; they will dry much quicker and wear fully as well. Any manufacturer will supply you with material especially adapted for dipping if you give the facts regarding your product, the method of application, drying time desired, and the nature of the wood.

As an additional economy you could purchase the primer in paste form, if desired, already tinted; then you can reduce it with naphtha to the desired dipping consistency. This is the practice followed by many large manufacturers using primers in quantity.—I. F.

Substitute For Routed Line.

We are using a routing machine, as is customary, to rout the fronts of our case goods, and which routing we then highlight in gilt bronze. We are of the belief that there is someone making something in the nature of transfer work that could be glued to the veneers and then the whole varnished over. Can you give us any information on this?

There is, of course, nothing which may be applied to a front which will exactly duplicate the effect of a routed line. It would be possible to stripe with gilt by hand on the flat surface and protect this with varnish, but the permanence of result would not be the same as if the gilt were applied within the routing.

As an alternative to this striping, you can secure either a convex moulding as supplied by

the Decorators Supply Company, 2447 Archer Ave., Chicago, or a continuous transfer which might have to be made special. It would also be possible to use marquetry providing a gold bronze line is not essential, but this would probably run into money as against the other systems.—I. F.

Why Enamel Scales Off.

In reply to A. L. Price's question in July issue, will say that the first and most important step toward obtaining a good enamel job is to get the best material that is to be had.

There is no advantage in two coats of enamel unless the very highest class of job is desired. If such is the case, it is necessary to have sufficient undercoats, and to rub the first coat of enamel with pumice stone and water.

Two applications of undercoat material are hardly enough to give a good body unless they are both very thick. The use of thick undercoats sometimes causes peeling, as the average undercoat dries so quickly that it lays more on top of the wood than getting into the pores. A more satisfactory job is obtained in less time by using more and thinner undercoats.

If you do not care to use more than the four coats you mention (two undercoats and two coats of enamel), then you will find it better to put on three applications of undercoat material, the last one being part enamel, then the final coat of enamel. Better still would be to first put on a very thin undercoat so it would secure good anchorage in the wood, then two applications of undercoat material, followed by a coat of "half and half", and then the final coat of all enamel.

YOU can save at least 75c per gallon on Paint and Varnish Remover by the Campbell Process. Only two ingredients to buy. Simply pour the two liquids together and the result is the BEST Remover you ever tried.

Write for our FREE Booklet "Getting Away From the High Cost of Paint & Varnish Remover." It tells how to save a lot on your refinishing costs.

If you are too busy to write a letter, pin this ad to your card or letterhead and mail it in. We'll know what you want.

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"For paint or lacquer spraying, The Kellogg Unit System of air compression is superior in every respect to central source systems."

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Kelloggs
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SPEED
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Our Territory
Since 1873

SHELLAC BLEACHERS
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All cuts, special formulas, weight and purity guaranteed
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Used on Automobiles, Wood Furniture, Metal Novelties, and Toys.

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Manufactured by
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Some of the soft woods of today are so sappy that it is necessary to apply a wash coat of shellac before putting on anything else. When only the enamel peels off it is probably a sign of poor-grade enamel or, in the case of only the last coat of a two-coat enamel job peeling, it may be due to the fact that you didn't rub your first coat of enamel; you left a glossy smooth surface to be covered by the last coat, and as a result the last coat wouldn't cling to it properly.

Regarding the use of lacquer on fixtures, if you will get in touch with some of the makers of lacquer who advertise in INDUSTRIAL FINISHING, they will be glad to give you information along this line. There is no reason why you couldn't use it, as it is being successfully used on furniture, automobiles and many other articles.—C. K. J.

Refinishing Oak Woodwork.

Have been reading your INDUSTRIAL FINISHING magazine and have found it a great help to me.

I have oak woodwork finished natural with paste filler and two coats of varnish. Is there a successful way to make it dark oak without removing the finish?—C. E. F.

There are two methods of securing the dark oak finish you want, but frankly, both are makeshifts. The first is to dissolve a small amount of walnut spirit aniline in denatured alcohol; then mix in white shellac, about a pint of stain in a quart of 4-lb. cut shellac. This will have to be brushed on with great care to avoid softening and wiping through the old varnish.

Imprisoned Beauty

BEAUTY is held forever in the shining surface that has been treated with a good lacquer.

Age does not dull the finish, but adds new lustre.

Egyptian Lacquers have been considered superior products for nearly fifty years.

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FINISHES

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Are made in a Modern Plant Devoted to making Industrial Finishes only.

The Kay & Ess Company

Dayton, Ohio

The "Lithowhite" Brand

OF PURE SILEX

Made from pure, massive, crystalline, non-absorbent quartz, by the tub ground under water, floated, and precipitated process.

Especially recommended for forming a permanent base in Wood Fillers, and for imparting porosity to Paints—

"The World's Standard for Over 40 Years"

Sole Manufacturers

The Lithowhite Silex Company

NEW MILFORD, CONNECTICUT

The second method is to secure any good brand of household varnish stain of a dark oak shade and brush on over the old varnish.

Both of these methods will change the color, but will not offer durable protection; in the case of the latter, if the new finish chips off it will reveal the original light color beneath. That is why a complete refinish is the best method.—I. F.

Staining Rock Maple.

Up to the present time we have been unable to find a satisfactory black stain for use on Rock Maple Crutches.—C. & C. Co.

The only satisfactory way of staining so hard a wood as rock maple is to soak the object in a hot bath of aniline stain solution made up of 6-oz. ebony powder to the gallon of water. The bath must be kept hot all of the 24 hours, and a very rich ebony finish will result.—I. F.

Canoe Refinishing.

Under the above heading, in July issue, G. F. H. inquires about the details of refinishing canoes. The first thing to do is apply good varnish remover and let it soak through the old finish. Then scrape off the old finish or scrub it off with a stiff brush. When the finish is removed wash the surface thoroughly with turpentine or gasoline; let it stand 24 hours to dry, and then sandpaper it. Now apply the priming coat. This should be heavy to fill up the canvass. Mix about three pounds of lead, 1 pint of turpentine, 1 pint of spar varnish and 1 tablespoonful of good drier.

When this coating is dry apply one or two coats of japan color thinned to work easily and follow with two coats of good spar varnish. Enamel can be used instead of spar varnish, but it would check more quickly than japan color finished with the high-grade varnish.

The interior of the canoe can be finished in clear spar varnish or painted as the outside.

For patching torn or worn places in the canvass, one may use 8-ounce canvas duck, pasting it on with a mixture of white lead and rubbing varnish. This mixture, with the addition of whiting, may be used for "puttying" small holes. After a canvas patch has been applied it should be reinforced with brass or copper tacks clinched on the inside. —J. K. Co.

Staining Poor Joints.

When the lines resulting from butt joints fail to make a good match, take a camel-hair pencil or brush and a dark stain and carefully fill in, making the lines wider or extending them as may be found necessary.—M. D. C.

New Book On Shellac.

"The Romance of Shellac" is the title of a new illustrated booklet containing, in compact form, an interesting story of the origin of shellac, the bleaching process, and the complete manufacture of shellac from the gum to its varnish state. The booklet, which is for free distribution, is copyrighted and published by M. Feigel & Bro., Inc., 185 Wooster St., New York City.

For Gold, Silver or Brass

No. 82 Water White Lacquer

Gives Exceptional Value

We have manufactured lacquers for all finishes since 1857

Chas. Cooper & Co.

90 Worth St., New York

Works—Newark, N. J.

Black Veneers.

To dye veneers black, use logwood extract and yellow prussiate of potash, as per the following: Boil an ounce of logwood in three and one-quarter pints of water; when the dye has been completely extracted add to it one dram of yellow prussiate of potash. The color will at first show purple but it almost immediately becomes jet black. There are other formulas, but this does very well. For instance, nigrosine black gives a true jet black, and it is much easier to make than the other one.—O. F. C.

Good Oil Stains O. K.

On page 34 of your July. 1925. issue, there is a letter entitled "Experience with Stains", signed F. R. Matters of this kind can be profitably discussed in such a publication as yours, and we feel that it is unquestionably to the benefit of the trade in general that discussions along these lines should be encouraged. We are inclined however to question some statements made in this communication.

The writer of the letter reports unsatisfactory experience with oil stains, due quite likely to the use of stains of inferior quality. No penetrating oil stain properly made will leave a greasy or oily residue on the surface.

Oil stains made according to the most modern process do not contain wax and certainly do not contain an excess amount of stearic acid. A small percentage of stearic acid may be contained in the colors themselves, but the proportion is exceedingly slight, and stearic acid itself is not used as a component or mixed into the solution.

The dipping process, while recommended for work of certain kinds, will not be desirable where there is any possibility of an excess amount of stain being absorbed. The liability of trouble in this connection can be to a large extent avoided by the use of proper reducers so that the stain is not too heavy when applied. The dipping process obviously allows for the use of a greater amount of reducer than in brushing on.

No oil stain should be applied so heavy as to sweat through succeeding finishing coats. One application of strictly pure shellac of high quality will set the stain, intensify the beauty of the finish, and serve to prevent sweating through later applications of varnish or other finishing materials.

It has never seemed possible to produce an oil mahogany that positively will not fade if exposed indefinitely to direct sunlight. There is no complaint however as a rule regarding fading in oil stains except in the mahogany tones. All other shades are fast to light and are considered strictly non-fading.

There is certain work for which water mahoganies and other water stains should be used, and there are other processes where oil stains give highly satisfactory results more economically, and are therefore to be preferred.

Your correspondent, in the letter referred to, also speaks of the use of oil stains on hard woods, and says that the use of filler directly over the stain will remove the excess stain and the grease or oil.

It can be pointed out that there should be no superfluous stain, no grease and no oily residue on the surface if a thoroughly penetrating stain is used, properly

Kroeger's Fillers Cut Costs

THE HEAVY BODY
permits of more thinning than other makes and as a result will cover from 10% to 25% more surface, reducing the actual cost of the Filler.

NON-CAKING
either in the original package or after having been thinned for use, eliminates another loss. No need to throw any of our goods away. YOU CAN USE IT ALL!

IN RUBBING OFF
the surplus wipes off easily, leaves the surface smooth, obviates the necessity of sanding and thus effects a saving in labor.

FILLS PERFECTLY
making a good foundation for the final finish and effects a saving in the number of finishing coats used.

Let us match the filler you are now using and submit a counter sample without cost or obligation

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Wood Filler Specialists Since 1887

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BUTYL PROPIONATE

A Nitrocellulose Solvent with a boiling range of 120° to 160° C, and dissolving practically no water.

Gives maximum speed and flow to Lacquer. Assists materially in preventing blushing or blooming.

A most economical Solvent to use.

Manufactured by the Wilbur White Chemical Co.

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BRANCH OFFICES:

Chicago Philadelphia Boston Cleveland Gloversville, N. Y.

made according to the highest standards. Oil stains of high quality are now manufactured which do not even require any wiping off after application.

I point out these things merely in a general way, knowing that many reputable manufacturers prefer oil stains to water stains, and vice versa, and in some plants both kinds of stain are used—water stains for one class of work and oil stains for another.—H. B. Young, Treas., James B. Day & Co.

AUTO LACQUERS
Contains no gum whatsoever.
We have made lacquers for all finishes since 1857
Chas. Cooper & Co.
90 Worth St., New York
Works—Newark, N. J.

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Advertisements under this heading 45 cents a line, minimum charge $1.35. Use this department to obtain help, find positions, buy and sell equipment, dispose of manufacturing properties, etc.

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Wanted, having production experience on small parts, able to plan and route work for as many as fifty employees at a time. Absolutely essential that party be able to get maximum production as we do not have items requiring high-class finish, but must keep cost at minimum. Address IF-117, care INDUSTRIAL FINISHING.

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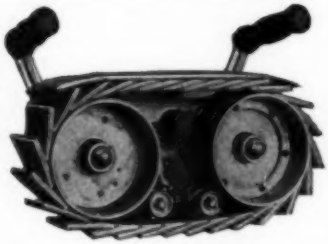
Man in each town to plate auto parts, reflectors, bathroom fixtures, refinish beds, mirrors, chandeliers; by new method. No capital or experience required. Simple plan of manufacturing at home starts you in big money-making business. Outfits furnished. Free particulars and proofs. GUN METAL CO., Ave. E, Decatur, Ill.

Today no individual or concern can be a good paint or varnish manufacturer without being a good co-operator.

FOR RUBBING AND POLISHING

A & T "One Way" RUBBING MACHINE
VERY FAST!



Rubs flat, concave and convex surfaces. Produces fine finish to lacquer or varnish.

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PROTECT-O-LAC

NON-DRYING NON-SOLVENT

For Masking Windows, Nickel Plating, Radiator Shells, Fenders, Two-Color Work, etc., in shops or plants using the spray painting system.

Lacquer or other materials will not stick to PROTECT-O-LAC. Instead of becoming tacky, the materials being sprayed will form a film when sprayed on PROTECT-O-LAC and may be removed by simply peeling off film and washing surface with water.

PROTECT-O-LAC is easy to apply—just apply it like paint, spread same to keep from running. The body of PROTECT-O-LAC is full covering and a two-inch varnish brush is suitable for application. It is a great labor saver and an absolute necessity in every plant using the spray painting system.

PROTECT-O-LAC contains no acids nor injurious substances and may be used over varnishes as well as other finishes in masking for two-color effects.

HALF GALLON CANS $3.25
ONE GALLON CANS 6.00

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MONEY BACK GUARANTEE

We will ship a trial order of one gallon C. O. D. anywhere with a guarantee that unless it does the work for which it is made, better, faster and more economically than any other preparation sold for the same purpose, the buyer's money will be promptly refunded.

ERBY SPRAY

The Finest Perfected Spray Made

The Erby Type "A" Spray is the only positive pressure cup spray that can be handled in any position giving an even spray at all times until material container is emptied.

An essential spray for all finishing departments.

For complete description, write

THE ERBY MFG. CO.
121 West Grand Ave.
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Continuous spraying in any position

BINKS Brings Out a New Booth!

Recognizing that the production of high quality finishes is dependent on the proper engineering of each unit of equipment, plus the co-ordination of these units to form a harmonious whole, the BINKS Organization has brought out a New Siphon Booth that aids in setting new standards for quality of finish and rate of production.

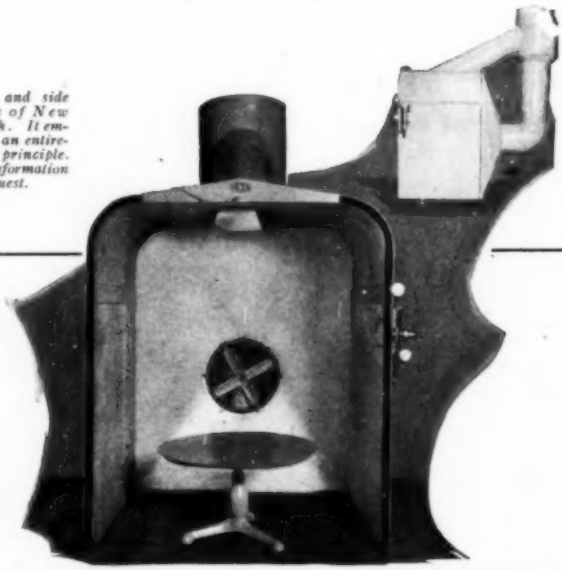
This New Siphon Booth is engineered to the same high standards as the famous No. 105 Gun with the "Strait-Port" Nozzle, the Oil and Water Extractor and Material Pressure Container. Each one of these items is the best to be had and is acknowledged to be the highest development in its field.

The New Siphon Booth is further evidence that the BINKS Organization is keenly alive to the problems of spray finishing and is the leader in offering their solution.

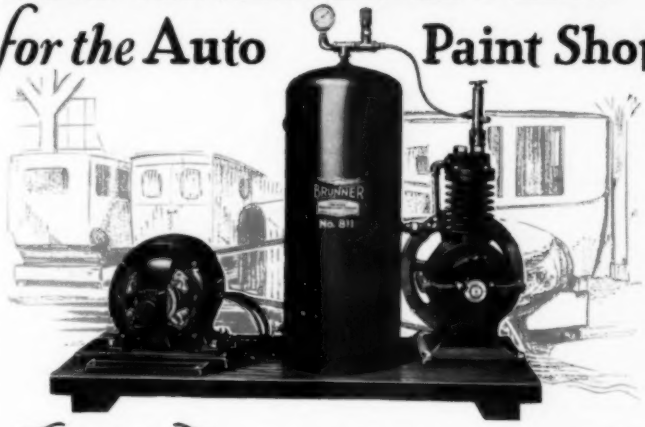
The co-operation of this organization is available for you in the solution of any finishing problems that may be confronting you. It is our desire to be of real service. Let us hear from you.

BINKS SPRAY EQUIPMENT CO.
3121 Carroll Ave., Chicago, Ill.

Front and side views of New Booth. It embodies an entirely new principle. Full information on request.



DEPENDABLE AIR
for the Auto Paint Shop



BRUNNER No. 811 COMPLETE UNIT

Especially adapted for the paint shop with one spray operator at a lower cost than the fully automatic type.

The unit consists of a 3x4 in. single cylinder compressor powered by a 1½ H. P. motor, oak tan leather belt, assembled and mounted on a hardwood base, Brunner unloading valve automatically unloads the compressor, without stopping the motor, when a predetermined pressure in the tank is reached. 15 gallon Brunner-drawn seamless steel tank and Brunner Safety Valve.

Designed for spraying pyroxalin lacquers. Has solid bottom and is free from leakage. Perfect balance, easy to clean.

Innumerable automotive painting establishments are today using Brunner Air Compressors. They were selected because of their proven dependability in constant daily use.

In a business where success depends so much on compressor equipment, it would be folly to pin any hopes on questionable equipment.

The experience gained by 20 years of successful manufacture is built into every Brunner Compressor. You can buy cheaper air compressors but not better ones.

Write for Folder "B" showing our complete line of paint spraying equipment.

BRUNNER
AIR COMPRESSORS

BRUNNER MANUFACTURING CO.
UTICA, N. Y.
Cincinnati Kansas City San Francisco

RICHLY beautiful, elastic, and extremely durable, Arcozon represents the highest development of a pyroxylin lacquer. Applied by the prescribed system, Arcozon will cling tenaciously, retaining its subdued luster in face of the most severe extremes of temperature or weather conditions. Complete information will be gladly submitted by our technical department.

THE ARCO COMPANY, CLEVELAND, OHIO
Paints • Varnishes • Enamels • Lacquers 91

ARCOZON

THE ARCO PYROXYLIN LACQUER SYSTEM